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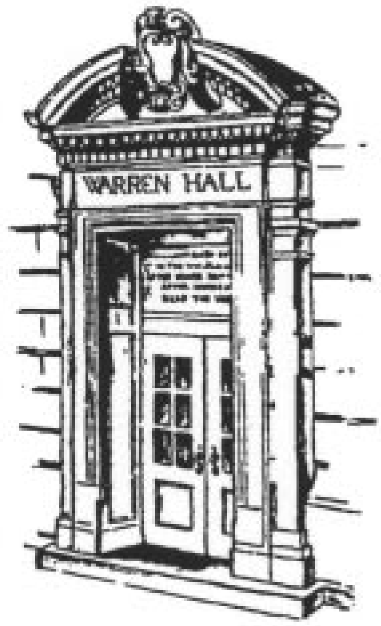

Staff Paper

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Estimating Risk-Adjusted Interest Rates for Dairy Farms

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Estimating Risk-Adjusted Interest Rates for Dairy Farms[1]

Loren W. Tauer[2]

Any decision that impacts the dairy farm over more than one year needs to be evaluated based upon the influence that decision might have on the temporal income flows resulting from that decision. The consensus in the investment literature is that if the objective of a firm is the maximization of profit or wealth of a business, then the Net Present Value (NPV) model is the appropriate procedure to evaluate investment decisions (Van Horne and Wachowicz). The NPV model requires a risk-adjusted interest rate to discount future income flows.[3] This interest rate should be unique to each dairy farm business, and should reflect the cost of capital to that farm.

Cost of capital is the combined cost of equity and debt capital. The cost of debt to a business firm is the interest rate it must pay for debt, either privately or publicly held. The cost of equity can be estimated by using the Capital Asset Pricing Model (CAPM), where the risk of a company's stock is measured relative to the risk of a diversified portfolio. What is important is the variability of the price of a stock relative to the variability of the market portfolio. The variance of the stock can be blended (diversified) with all other assets comprising the market portfolio. The concept is to let the market evaluate the riskiness of any investment by the market's evaluation of the past investments of the company. Since small dairy farms are not publicly traded, it is a challenge to estimate an appropriate risk-adjusted discount rate for those farms. The interest rate of debt is readily available to any farm that borrows money. What is difficult is an estimate of the opportunity cost of equity capital for the non-publicly traded firm.

In this paper I use a variation of the CAPM to estimate the cost of equity for the dairy farm. Dairy farms keep records to determine annual income from the business, and the market value of the business can be estimated annually. This net income and net asset value change of the farm is similar to the dividends paid by a publicly held company plus the change in the market price of the stock. That information is needed to compute a net return from the business and to use the CAPM. The additional information needed is to correlate the change in net return with the change in some market index. In corporate finance that market index is some comprehensive diversified portfolio, which can be held by any individual via an appropriate mutual fund. Few small dairy farmers hold diversified market portfolios. But the farmer should be interested in his farm's covariance with a similar portfolio of other dairy farms. As a market index I use the average return from a set of dairy farms. The risk of any dairy farm will then be measured relative to its peers.

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[2] Loren W. Tauer is Professor, Department of Applied Economics and Management, Cornell University.
[3] Investment analysis can also be accomplished by modifying the NPV with strategic options, valuing these options using contingent claims analysis, and using a risk-free interest rate to discount (Tauer).

There have been a significant number of articles using the CAPM to evaluate the U.S. farm real estate market, possibly beginning with Barry, and including Irwin et al., and Bjornson and Innes, among others. Most have concluded that farmland is not efficiently priced in the context of the CAPM or variations and extensions of that model. This is succinctly stated in Shiha and Chavas, who state that their findings raise serious questions about the validity of the traditional CAPM in modeling returns in farm real estate markets. They further state that the same would hold for the APT (Arbitrage Pricing Theory) model.

There appear to be few attempts to apply the CAPM or its variations to estimating a risk-adjusted discount rate for individual farmers. Collins and Barry (1986) and Moss et al., use single index versions to estimate risk-adjusted interest rates for discounting the investments in different crops and citrus varieties, respectively. Collins and Barry (1988) present a model to estimate a risk-adjusted discount rate for a proprietary firm, but their approach requires knowledge of the proprietor's risk attitude, which is difficult to empirically obtain, whereas the CAPM only requires that the investor be risk averse.

The Model

The annual return of a dairy farm is modeled as a single factor model:

$$r_i = r_f + b_i(r_F - r_f) + \varepsilon_i$$

where r_i is the annual return from farm i, which includes the annual return and appreciation in farm assets, r_f is the risk-free interest rate (one year U.S. Treasury Bill rate), b_i is the beta value for farm i, r_F is the average annual return on all the farms, and ε_i is the error term. This states that the expected return of an investment is equal to a risk-free rate plus a risk premium, which is equal to the farm portfolio rate minus the risk-free rate, multiplied by the asset's beta (which is the covariance of the priced asset and the farm portfolio divided by the variance of the farm portfolio).

The equation is estimated as:

$$(r_i - r_f) = \alpha_i + b_i(r_F - r_f) + \varepsilon_i$$

where the variable α_i is regarded as a measure of how well farm i is performing relative to its peers (after adjustment for risk). A farm with a positive α is performing better than the average farm given risk.

The risk-adjusted rate for farm i is then computed as:

$$r_{adji} = r_f + b_i(r_F - r_f)$$

This is cost of equity for farm i that can be used in capital investment analysis. This rate would be blended with the rate cost of debt, adjusted to reflect the income tax rate, using a weighted average.

This model could be extended by adding additional factors which impact individual farm interest rates. However, the systematic impact of those factors should be reflected in the farm portfolio return rate r_F.

Of interest may be the relationship between this factor model specification and the CAPM:

$$r_i = r_f + \beta_i (r_M - r_f),$$

where β_i is the individual farm market Beta to the market portfolio and r_M is the market return. The relationship between the beta estimated from the farm portfolio and the market portfolio is derived in Sharpe et al., page 334 as:

$$\beta_i = COV(r_F, r_M) * b_i / VAR(r_M).$$

The model presented is the basic CAPM and through the years numerous modifications and extensions have been made to accommodate inflation, leverage, and non-market components, among others. Here basic model results only are reported. Given the empirical results it was deemed unproductive to pursue extensions and modifications.

Data

Data are from the New York Dairy Farm Business Summary. For the period 1988 through 1997 there were 63 farms that participated each and every year. This provided ten annual observations per farm regression. In applying the CAPM to publicly traded firms, monthly observations are typically used over a period of 5 years or more. That would provide 60 or more observations per firm, compared with only 10 observations per farm used here. Monthly observations are not available for these farms.

Annual return to equity per farm is taken from the New York DFBS as reported in those annual reports (Knoblauch and Putnam). That is computed as net farm income plus inventory adjustments and appreciation of capital assets. The value of unpaid family labor and that of the operator's labor and management is subtracted. This net sum is then divided by the average of beginning and ending equity to determine the rate of return to equity capital.

There are some potential biases in these computations. The value of unpaid family labor is calculated with the same monthly rate across all farms (but which varies by year, $1,550 per month in 1997). This constant rate may not be applicable for the quality of unpaid family labor provided across farms. In contrast, the value of the operator's labor and management is estimated and provided by each farm participant. The market value of the business, which determines the appreciation, is also estimated and provided by each farm participant. There may be participant bias in these values. Yet, each farm data entry is monitored by an extension agent and checked by faculty at Cornell.

The market index used in each regression is simply the average of the rates of return from the 63 farms for each year. This is not weighted by the amount of equity per farm. For the risk-free interest rate the monthly auction rates for new one-year T-bills are used, with the geometric average annual rate computed for each of the ten years.

The data are summarized in Table 1. The average rate of return for the 63 farms varied from a high of 12.04% in 1989 to a low of -1.10% in 1997. In seven of the ten years the risk-free rate was greater than the average of the rate of return from the 63 farms.

Table 1. Summary of Data for CAPM Estimates

Year	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*Ave*
Ave. ROE	7.48	12.04	4.26	0.93	4.48	3.03	4.42	1.90	4.86	-1.10	4.23
T-Bill Rate	7.10	7.93	7.35	5.5	3.73	3.32	4.89	5.69	5.22	5.33	5.61
Difference	0.38	4.11	-3.09	-4.57	0.75	-0.29	-0.47	-3.79	-0.36	-6.43	-1.38
NFI Rate	18.37	21.58	13.68	10.82	14.23	12.02	13.25	10.19	12.63	6.48	13.32

Results

The alpha and beta values for each of the 63 farms were estimated by a separate linear regression per farm. The results for each farm are shown in Table 2. For each farm the estimated alpha and beta are shown as well as the standard errors of these estimates. (The NFI beta column will be discussed later.) Also shown is the R^2 value of each equation and the t-statistic tests of whether alpha is equal to zero, and beta is equal to one.

The alpha value reflects the return that a farm earned after adjusting for risk. In an efficient market with a market index, it is expected that the alpha value should be equal to zero, since any value greater than zero would indicate that the farm is earning more than necessary to compensate for the risk of the farm. That would imply that the market is not efficient. However, these farms are privately held by owners who, for the most part, do not have well diversified portfolios. In addition, the market index used in this regression is not a diversified market portfolio. The alpha value for each farm can be interpreted as the rate of return of a farm relative to its peers after adjusting for risk of that specific farm. An alpha value greater than zero would indicate that a farm is doing much better than its neighbors. The alpha values for these 63 farms range from a high of 21.63 to a low of negative 29.90, with 35 of the 63 values being negative. The average alpha value is 0, as it should be since the index used is the average of the 63 farms. The t-test of whether alpha=0 produced 27 values greater than absolute value of 2, indicating that 27 of the 63 farms had alpha values different from zero.

Table 2. CAPM Estimates for Individual Dairy Farms

Farm	*Alpha*	*Beta*	*NFI Beta*	*S.E. Alpha*	*S.E. Beta*	R^2	*t-statistic Alpha=0*	*t-statistic Beta=1*	*Risk-adjusted Interest Rate for the Period*
1	-2.97	-0.40	-0.22	1.57	0.49	0.08	-1.89	-2.87	6.16
2	0.86	1.52	1.27	1.84	0.57	0.47	0.47	0.91	3.51
3	5.69	0.17	-0.15	1.47	0.46	0.02	3.86	-1.81	5.37
4	-7.59	1.73	1.68	2.67	0.83	0.35	-2.84	0.88	3.22
5	-2.80	0.83	0.86	1.21	0.37	0.38	-2.32	-0.46	4.47
6	11.36	0.69	0.90	3.55	1.10	0.05	3.20	-0.28	4.66
7	-5.63	-0.10	-0.25	1.55	0.48	0.01	-3.63	-2.29	5.75
8	8.08	3.18	2.60	1.44	0.45	0.86	5.62	4.89	1.23
9	-0.12	0.24	0.15	1.52	0.47	0.03	-0.08	-1.63	5.29
10	2.23	0.71	0.63	1.41	0.44	0.25	1.58	-0.66	4.63
11	0.98	0.29	0.73	2.60	0.81	0.02	0.38	-0.88	5.21
12	7.03	2.56	2.53	3.14	0.97	0.46	2.24	1.61	2.08
13	-11.02	0.80	0.34	2.07	0.64	0.16	-5.31	-0.31	4.50
14	-3.82	0.84	0.39	2.58	0.80	0.12	-1.48	-0.20	4.45
15	-1.21	0.76	0.49	1.71	0.53	0.20	-0.71	-0.45	4.56
16	-2.79	0.48	1.80	2.59	0.80	0.04	-1.08	-0.65	4.95
17	3.18	0.87	0.80	2.09	0.65	0.18	1.52	-0.20	4.41
18	1.70	0.45	0.46	1.11	0.34	0.18	1.53	-1.60	4.99
19	-2.21	-0.25	0.23	2.47	0.77	0.01	-0.90	-1.63	5.95
20	-1.24	1.43	1.26	1.29	0.40	0.62	-0.97	1.08	3.63
21	1.72	1.15	0.97	0.78	0.24	0.74	2.22	0.64	4.02
22	-1.19	2.05	2.22	2.89	0.89	0.40	-0.41	1.17	2.78
23	-1.70	0.69	0.65	4.37	1.35	0.03	-0.39	-0.23	4.65
24	5.31	-0.14	0.47	1.03	0.32	0.02	5.17	-3.58	5.80
25	-2.46	0.47	0.46	1.24	0.39	0.16	-1.98	-1.38	4.97
26	21.63	3.03	4.11	5.24	1.62	0.30	4.13	1.25	1.43
27	-0.45	0.21	0.32	1.24	0.38	0.04	-0.37	-2.05	5.31
28	1.45	0.67	0.90	2.32	0.72	0.10	0.62	-0.46	4.69
29	9.80	1.41	1.52	1.97	0.61	0.40	4.97	0.68	3.66
30	-1.54	0.29	1.10	3.87	1.20	0.01	-0.40	-0.59	5.20
31	-26.90	2.80	1.66	5.45	1.69	0.26	-4.94	1.06	1.75
32	-10.79	0.69	1.75	5.03	1.56	0.02	-2.14	-0.20	4.66

continued

Table 2. CAPM Estimates for Individual Dairy Farms

Farm	*Alpha*	*Beta*	*NFI Beta*	*S.E. Alpha*	*S.E. Beta*	R^2	*t-statistic Alpha=0*	*t-statistic Beta=1*	*Risk-adjusted Interest Rate for the Period*
33	-5.25	3.01	3.01	6.43	1.99	0.22	-0.82	1.01	1.46
34	-2.56	2.16	1.79	2.32	0.72	0.53	-1.11	1.61	2.64
35	-3.91	2.33	2.67	2.95	0.92	0.45	-1.32	1.46	2.39
36	0.79	0.41	0.44	1.67	0.52	0.07	0.47	-1.14	5.05
37	-1.86	0.45	0.28	1.64	0.51	0.09	-1.13	-1.08	4.99
38	-2.41	0.51	0.61	2.10	0.65	0.07	-1.15	-0.75	4.90
39	-0.46	0.68	0.58	1.54	0.48	0.20	-0.30	-0.67	4.67
40	-2.91	0.87	1.04	1.27	0.39	0.38	-2.28	-0.32	4.40
41	0.16	-0.13	0.35	2.56	0.79	0.00	0.06	-1.43	5.79
42	-5.06	0.35	-0.17	1.84	0.57	0.05	-2.76	-1.14	5.12
43	-2.87	0.94	0.78	4.83	1.50	0.05	-0.59	-0.04	4.31
44	-7.43	1.46	1.56	2.38	0.74	0.33	-3.12	0.63	3.59
45	-2.40	1.21	0.56	2.24	0.69	0.28	-1.07	0.30	3.94
46	-1.37	1.06	0.74	1.02	0.32	0.58	-1.35	0.18	4.15
47	0.13	2.37	1.96	1.89	0.59	0.67	0.07	2.34	2.34
48	1.26	1.85	1.78	2.26	0.70	0.47	0.56	1.21	3.06
49	3.61	1.33	0.96	1.28	0.40	0.59	2.83	0.85	3.77
50	1.02	0.11	-0.06	1.51	0.47	0.01	0.68	-1.90	5.45
51	-2.53	0.13	0.60	1.17	0.36	0.02	-2.16	-2.39	5.43
52	1.60	1.25	1.02	1.76	0.55	0.40	0.91	0.47	3.88
53	-6.88	1.21	1.07	2.23	0.69	0.28	-3.08	0.31	3.94
54	15.98	2.27	1.87	1.79	0.55	0.68	8.94	2.29	2.48
55	1.05	0.48	0.40	1.58	0.49	0.11	0.66	-1.07	4.95
56	11.79	1.57	0.79	3.28	1.02	0.23	3.59	0.56	3.44
57	14.12	1.01	0.70	2.60	0.80	0.17	5.43	0.02	4.21
58	-2.46	-0.69	-0.49	2.64	0.82	0.08	-0.93	-2.07	6.57
59	5.14	0.55	0.67	0.61	0.19	0.51	8.38	-2.36	4.85
60	8.44	2.30	1.97	4.53	1.40	0.25	1.86	0.92	2.44
61	9.64	1.22	1.02	2.25	0.70	0.28	4.28	0.31	3.93
62	-14.88	-1.30	-0.54	4.88	1.51	0.09	-3.05	-1.52	7.41
63	-4.06	1.92	2.17	1.67	0.52	0.63	-2.43	1.78	2.96
Ave.	0.00	1.00	1.00			0.25			4.23

The beta value reflects the riskiness of a farm relative to its neighbor. A beta value less than one shows that the risk of a farm is less than its peers, while a beta value greater than one shows that the risk of a farm is greater than its peers. A negative beta value means that the risk of a farm is less than the risk of the risk-free interest rate. There are 27 beta values greater than one and 36 values less than one, with 7 of these 36 values negative. The t-test of whether beta=1 produced 10 values greater than absolute value of 2, indicating that statistically only 10 farms had a beta value different from one. That implies that most of these farms should use the average rate of return earned for the group as the appropriate cost of equity.

The R^2 values of the regressions show how much of the risk of a farm is systematic with its peers. A high R^2 value indicates that the risk of an individual dairy farm is related to the same risk that impacts its peers. A low R^2 value indicates that the risk facing a dairy farm is separate from the systematic risk facing its neighbor. The R^2 values averaged .25 across the 63 farms with a maximum value of .86 and a minimum value of .01. The median value of R^2 was .20. These generally low R^2 values indicated that a multi-factor model might have potential.

As stated in the model section, it is possible to covert computed betas to betas computed from an alternative market index by the equation, $\beta_i=COV(r_F,r_M)*b_i/VAR(r_M)$, where r_F is the farm market index, and r_M is an alternative index. The Russell 3000 annual total return index was used as r_M. The Russell 3000 index represents the 3,000 largest traded companies in the U.S. based upon market capitilization.[4] The variance of this index over the 10-year period was 189.63, and the covariance with the dairy farm index was -7.93. This gives an adjustment factor of -0.04 to covert b_i to β_i, essentially converting all farm betas associated with the Russell 3000 market index to zero. This implies that dairy farms have no systematic risk with the overall market and should earn the risk free rate in a diversified market. These farms are not held in a diversified portfolio, although on average they earn 138 basis points less than the risk free rate (12 month T-bill).

Risk-Adjusted Interest Rates

With some of the beta values being quite high, it would be expected that the risk-adjusted rate on some of these farms is high. That is not the case, however, since the difference between the market rate of return for this group of farms and the risk-free rate is very small, in many years being negative. In fact, if the average farm portfolio return of 4.23% and the average risk-free rate of 5.61% from the 10-year period were used, then the difference is a negative 1.38%. Using that difference value and the individually computed beta's for each of the 63 farms generates the individual farm risk-adjusted interest rates shown in Table 2. These risk-adjusted interest rates range from a high of 7.41% to a low of 1.23%. They average 4.23%, the average return of the farm portfolio. However, because the average farm portfolio return is lower than the average risk-free rate, a high

[4] The Russell 3000 index is a proprietary index computed by the Frank Russell Investment Management Company, P.O. Box 1591, Tacoma, WA 98401. I want to thank them for providing these index values.

individual farm beta results in a low risk-adjusted interest rate rather than a high risk-adjusted interest rate.

Limitations and Further Work

Although these results are informative they have limitations. The most significant is that only 10 observations were available per farm. Only annual observations from farms are available and it would be a challenge to obtain farm data for much more than ten years. Yet, another 2 or 3 years of data on some of these farms may be available and, by using this data, it may then be determined if alpha and beta estimates change. These may not be stable over the business cycle. Yet, as Luenberger demonstrates, mean return estimates are inherently unreliable, even with a large number of observations.

Another limitation is that many values are not determined directly by the market. Farm values are estimated by each participant. This introduces potential bias. Although it is plausible that many farmers over-estimate increases in market values and under-estimate decreases in market values, another concern is that other farms do not accurately estimate true market values. Some participants may routinely increase the value of the business by some constant rate or dollar value, while others may only increase the estimated value of the farm every few years.

Currently the return to equity is computed by removing the estimated value of operator's labor and management from NFI. That is consistent with corporate valuation where management is reimbursed. However, the farmer is determining the value of labor and management. And if labor and management is being accurately estimated then shouldn't alpha coefficients be zero? This issue relates to the question of whether capital should receive residual profit or whether labor management should receive that profit, or philosophically whether capital hires labor, or whether labor hires capital. In a proprietary firm where the equity owner is providing the labor that may not be a moot issue.

To determine the sensitivity of the estimated betas to the estimate of operators' labor and management, new betas were estimated using net farm income (NFI) with appreciation. The difference between NFI and return to equity is that NFI includes the estimated value of operators' labor and management, as well as the computed value of unpaid family labor. If the operators' human capital is fixed to the farm capital, then beta estimation using this composite return may be appropriate. The rate of return to NFI is computed by dividing NFI by average equity. NFI is greater than return to equity, and the average NFI return rates are above the risk-free rate for each of the 10 years as seen in the last row of table 1. The estimated betas from NFI are listed in table 2 in a column beside the return to equity betas. The betas for each farm are similar with only a few exceptions. The other statistics from the NFI beta estimates, although not shown, were also similar to the previous return to equity estimates. The correlation between the two beta estimates over the 63 farms is 0.89. A linear regression of the ROE beta on the NFI beta produced a constant of 0.06 and a slope coefficient of 0.94 (t-statistic of 15.06), R^2 = 0.79.

Finally, an attempt could be made to generalize these results by type of farm. Beta estimates may be regressed on farm characteristics to determine patterns. This would also permit projecting risk-adjusted interest rates for dairy farms outside this sample, but with similar characteristics of these farms.

Conclusions

The question is whether these computed risk-adjusted interest rates should be used by the individual dairy farms in NPV analysis. I would conclude no. They are simply too low. Dairy farming is not risk free as these rates would imply. The rates may be low because the dairy industry is probably over capitalized and in disequilibrium. Over the period 1988 through 1997, the number of New York dairy farms declined from 14,2000 farms to 9,000 farms. Farm numbers continue to fall. Yet, if this industry is over capitalized then one would expect asset values would decline to generate higher rates of return. That apparently is not reflected in these data.

References

Barry, P.J. "Capital Asset Pricing and Farm Real Estate." *AJAE* 62 (August 1980):549-553.

Collins, R.A. and P.J. Barry. "Risk Analysis with Single-Index Portfolio Models: An Application to Farm Planning." *AJAE* 68 (February 1986):152-161.

Collins, R.A. and P.J. Barry. "Beta-Adjusted Hurdle Rates for Proprietary Firms." *J. of Economics and Business* 40 (1988): - .

Bjornson, B. and R. Innes. "Another Look at Returns to Agricultural and Nonagricultural Assets." *AJAE* 74 (February 1992):109-119.

Irwin, S.H., D.L Forster, and B.J. Sherrick. "Returns to Farm Real Estate Revisited." *AJAE* 70 (August 1988):580-587.

Knoblauch, W.A. and Putnam, L.D. Dairy Farm Management Business Summary, New York State, 1997. R.B. 98-06, Department of Agricultural, Managerial, and Resource Economics, Cornell University, Ithaca, NY. 1998.

Leunberger, D.G. *Investment Science*. Oxford: Oxford University Press, 1998.

Moss, C.B., R.N. Weldon and R.P. Muraro. "The Impact of Risk on the Discount Rate for Different Citrus Varieties." *Agribusiness* 7 (1991):327-338.

Sharpe W.E., G.J. Alexander and J.V. Bailey. *Investments*. Fifth Edition. Prentice Hall, 1995.

Shiha A.N. and J-P. Chavas. "Capital Market Segmentation and U.S. Farm Real Estate Pricing." *AJAE* 77 (May 1995):397-407.

Tauer, L.W. "Investment Analysis in Agriculture." NATO Advanced Research Work-shop, Economics of the Dairy Industry in Central and Eastern Europe, Polanica Zdraj, Poland, June 5-7, 2000. Staff Paper 2000-03, Department of Agricultural, Resource, and Managerial Economics, Cornell University, April 2000.

Van Horne, J.C. and J. M. Wachowicz, Jr. *Fundamentals of Financial Management*. Tenth edition. New Jersey: Prentice-Hall, 1998.